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IS:7016 (Part VIII)-1975

Indian Standard

**METHODS OF TEST FOR
COATED AND TREATED FABRICS**

PART VIII ACCELERATED AGEING

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BUREAU OF INDIAN STANDARDS
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*Indian Standard*METHODS OF TEST FOR
COATED AND TREATED FABRICS

PART VIII ACCELERATED AGEING

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Indian Standard

METHODS OF TEST FOR COATED AND TREATED FABRICS

PART VIII ACCELERATED AGEING

0. FOREWORD

0.1 This Indian Standard (Part VIII) was adopted by the Indian Standards Institution on 25 September 1975, after the draft finalized by the Treated Fabrics Sectional Committee had been approved by the Chemical Division Council, the Mechanical Engineering Division Council and the Textile Division Council.

0.2 It is not possible to follow the same procedure for accelerated ageing test for fabrics coated with rubber and plastics as adopted for other rubber and plastics goods, the main reasons being relatively large area coupled with thin coatings which will not normally provide test pieces suitable for measurement of physical properties.

0.3 It is not feasible to establish a fixed and universal relationship between the duration of ageing in the oven and the useful life of the objects; such relationships can be established only for each individual case.

0.4 This standard is essentially based on ISO/R 1419-1970 'Accelerated ageing and simulated service test of fabrics coated with rubber or plastics' issued by the International Organization for Standardization.

0.5 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS: 2-1960*.

1. SCOPE

1.1 This standard (Part VIII) prescribes the methods of test for accelerated ageing and simulated service tests of coated and treated fabrics.

2. TEST METHODS

2.1 The following two ageing tests are given:

- a) Oven method, and
- b) Oxygen pressure method.

*Rules for rounding off numerical values (*revised*).

2.2 For all test purposes, the minimum time between vulcanization or curing and testing shall be 16 hours. Whenever possible, the time between vulcanization or curing and testing shall not exceed three months. In other cases, tests shall be made within two months of the date of receipt of the product by the customer.

3. TEST PIECES

3.1 Test pieces shall be taken at not less than 100 mm from the selvage and not less than 1m from the end of the roll or piece. The size of the test piece depends upon the property to be examined. For examination of properties, such as tear, waterproofness, etc, the dimensions of the test piece shall be those required by the particular method. For purposes of ascertaining the degree of stiffness, or decomposition, a test piece not less than 100×50 mm for the oven method and not less than 75×25 mm for the oxygen pressure method shall be used.

4. OVEN METHOD

4.1 Apparatus—The air-oven shall be of such a size that the total volume of the test pieces does not exceed 10 percent of the free air space of the oven. Provision shall be made for suspending test pieces vertically so that they are not within 10 mm of each other or the sides of the oven. Provision shall be made for slow circulation of air in the oven of not less than three changes and not more than ten changes per hour. Care shall also be taken that the incoming air is heated to the temperature of the oven before coming into contact with the test pieces. The temperature of the oven shall be thermostatically controlled so that the test pieces are kept within $\pm 1^\circ\text{C}$ of the specified ageing temperature. A thermometer shall be placed near the centre of the test pieces being aged to record the actual ageing temperature.

NOTE—Copper or copper alloys or both together shall not be used for the construction of oven.

4.2 Procedure—Place the test pieces in the oven vertically after they have been preheated to the operating temperature. The test pieces are to be stationary, free from strain, freely exposed to air on all sides and not exposed to light. When the ageing period is complete, remove the test pieces from the oven and store and condition at room temperature for not less than 16 h or more than 96 h, in a strain-free condition and then condition in accordance with the details given in the appropriate test method for the particular physical property being studied.

4.2.1 Where ageing is conducted on the 100×50 mm test pieces, they shall be observed and handled for any signs of softening, stiffening, tackiness, brittleness, discolouration, or other loss of properties, and the presence or absence of the characteristic odour of decomposition shall be noted. This shall be done in comparison with the unaged material.

Where the test pieces are exposed at a temperature of 100°C they shall also be examined for additional properties, such as tensile strength and tear. The duration of test shall be 1, 3, 7, 10 or some multiple of 7 days and the temperatures of test shall be $70 \pm 1^\circ\text{C}$ or $100 \pm 1^\circ\text{C}$ as may be stipulated in the individual material specification. The pressure shall be atmospheric.

4.2.2 As far as possible, avoid simultaneous ageing of different types of compounds in order that migration of sulphur, anti-oxidants, plasticizers or stabilizers may not occur. As a guideline, samples may be aged together where the following conditions are satisfied:

- a) Polymers are of the same general type;
- b) Vulcanizates having the same sulphur content;
- c) Vulcanizates having broadly the same type of anti-oxidants, anti-ozonants and UV absorbers; and
- d) Vulcanizates having plasticizers of approximately the same volatility.

5. OXYGEN PRESSURE METHOD

5.1 Apparatus — The oxygen pressure chamber shall consist of a vessel of stainless steel or other suitable material designed to retain an internal atmosphere of oxygen under pressure with provision for placing test pieces within it and subjecting them to controlled uniform temperature. The size of the vessel is optional but shall be such that the total volume of the test pieces does not exceed 10 percent of the free space of the vessel. Copper or brass parts shall be neither within the ageing chamber nor used in the construction of the tubing leading through the oxygen reservoir to the ageing chamber. The heating medium which surrounds the vessel is thermostatically controlled and a thermometer shall be immersed in the heating medium. The pressure chamber shall be equipped with a reliable safety valve set at 3400 kN/m^2 (approx 34 kgf/cm^2) and a pressure gauge shall be connected to the apparatus.

NOTE — The heating medium is optional. Water, air or other fluids known to be safe in the presence of oxygen may be used. Water has an advantage because of its rapid heat transfer and non-combustible nature. If air is used, the heated air shall be thoroughly circulated by means of mechanical agitation and baffles shall be used as required to prevent local overheating and dead spots. Oils or other combustible fluids are extremely hazardous in the presence of oxygen and should not be used as a heating medium for this test.

5.2 Procedure — Heat the test pieces to the operating temperature suspended vertically in the pressure chamber after it has been dried. Before commencing the test, flush out the air inside the chamber by allowing oxygen into it and keeping the outlet valve open for sufficient time. The chamber is then filled with oxygen to the required pressure.

Maintain the test pieces in the vessel stationary, free from strain and freshly exposed to the oxygen on all sides. Pass oxygen into the pressure chamber at a pressure of $2050 \pm 100 \text{ kN/m}^2$ (approx $20.5 \pm 1 \text{ kgf/cm}^2$) maintaining the exposure continuous for the specified time, without pressure reduction or opening of the chamber. The temperature shall be maintained at $70 \pm 1^\circ\text{C}$. The duration of the test shall be 24 hours or some multiple thereof.

5.2.1 When the ageing period is complete, release the pressure in the pressure chamber slowly and uniformly (this requires at least five minutes), taking particular care to see that all the pressure is released as indicated by the pressure gauge. Remove the test pieces from the vessel and condition in accordance with the details given in the appropriate test method for the particular property being studied.

5.2.2 As far as possible, avoid simultaneous ageing of different types of compounds in order that migration of sulphur, anti-oxidants, plasticizers or stabilizers may not occur. As a guideline, samples may be aged together where the following conditions are satisfied:

- a) Polymers are of the same general type;
- b) Vulcanizates having the same sulphur content;
- c) Vulcanizates having broadly the same type of anti-oxidants, anti-ozonants and UV absorbers; and
- d) Vulcanizates having plasticizers of approximately the same volatility.

6. EXPRESSION OF RESULTS

6.1 State the number of test pieces and express the results in accordance with the recommendations of the appropriate test method for the particular test being carried out.

6.2 Determine the properties of the test pieces aged for different periods as the intervals terminate in the process of ageing.

6.3 Report the test results of both the unaged (O) and the aged (A) test pieces and record percentage change in physical or mechanical property using the formula:

$$\frac{O - A}{O} \times 100$$

where

O = mechanical or physical properties of the test piece expressed in appropriate units before ageing, and

A = mechanical or physical properties of the test piece expressed in the same units after ageing.

6.4 State the physical or mechanical properties determined and ageing conditions.

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